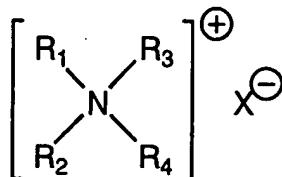


What is claimed is:

1. A surfactant blend comprising:
 - (a) an antimicrobial compound of the formula:



5

wherein

R₁ and R₂ are straight or branched chain lower alkyl groups having from one to seven carbon atoms;

R₃ is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms, or a benzyl group optionally substituted with C₁-C₆ alkyl;

10 R₄ is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms; and

X is an anion forming a water soluble salt, such as, halogen, methosulfate, saccharinate, sulfate, ethosulfate, tosylate, acetate, phosphate, nitrate, sulfonate, or carboxylate;

15 (b) an anionic surfactant;
(c) a bridging surfactant.

2. An antimicrobial composition comprising water and an amount of a blend according to

claim 1 effective to control the growth of microorganisms in contact with the composition.

20

3. An antimicrobial composition comprising water and an amount of a blend according to
claim 1 effective to produce a concentration of the anti-microbial compound of from about 1 to about 3000 ppm.

25 4. A blend according to claim 1, wherein the anionic surfactant is selected from the group
consisting of alkyl sulfates, alkyl ether sulfates, and alkyl sulfonates.

5. A blend according to claim 4, wherein the anionic surfactant is an alkyl sulfonate or alkyl sulfate having from about 8 to about 10 carbon atoms.

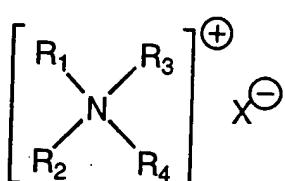
5 6. A blend accord to claim 5, wherein the bridging surfactant is an amine oxide or an amphoteric surfactant.

7. A method for controlling the growth of microorganisms, comprising contacting a surface suspected of containing microorganisms with a blend according to claim 1.

10

8. A surfactant blend comprising:

(a) a quaternary ammonium compound of the formula:



wherein

15 R_1 and R_2 are straight or branched chain lower alkyl groups having from one to seven carbon atoms;

R_3 is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms, or a benzyl group optionally substituted with C_1-C_6 alkyl;

20 R_4 is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms; and

X is an anion forming a water soluble salt;

(b) an anionic surfactant which is

(i) an alkyl sulfate having an average of from about 8 to about 16 carbon atoms;

(ii) an alkyl sulfonate having an average of from about 8 to about 18 carbon atoms;

25 (iii) an alkyl ether sulfate having an average of from about 8 to about 16 carbon atoms in the alkyl portion and from about 1 to about 30 moles of ethylene oxide;

(iv) an α -olefin sulfonate having an average of from about 12 to about 18 carbon atoms;

(v) an α -sulfonated C₁-C₆ alkyl ester of a fatty acid having an average of from about 11 to about 16 carbon atoms;

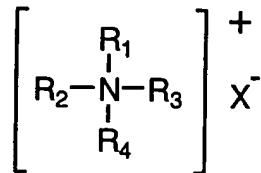
(vi) a sulfosuccinate having an average of from about 10 to about 16 carbon atoms;

5 (vii) a sarcosinate having an average of from about 10 to about 16 carbon atoms; or

(viii) a sulfoacetate having an average of from about 12 to about 20 carbon atoms; or mixtures thereof;

(c) a bridging surfactant selected from the group consisting of amine oxides, ethoxamides, and betaines;

10 optionally (d) a cationic surfactant which is a quaternary ammonium compound of the formula:



where

R₁, R₂, and R₃ are independently ethyl or methyl;

15 R₄ is an alkyl group having an average of from about 8 to about 16 carbon atoms; and

X is halogen, sulfate, methosulfate, ethosulfate, tosylate, acetate, phosphate, nitrate, sulfonate, or carboxylate;

wherein the total concentration of combined quaternary ammonium compound, anionic, and bridging surfactants is from about 30 to about 80 percent by weight, and wherein the surfactant blend is flowable.

20

9. An aqueous liquid phase comprising the blend of claim 8, wherein the cationic surfactant, anionic surfactant, and bridging surfactant are each present in an amount of from about 5 to about 35 percent by weight.

25 10. A blend according to claim 8, wherein the anionic surfactant is an alkyl sulfate having an average of from about 10 to about 12 carbon atoms.

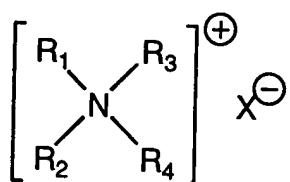
11. A blend according to claim 8, wherein the anionic surfactant is an α -sulfonated C₁-C₆ alkyl ester of a fatty acid having an average of from about 11 to about 16 carbon atoms.

5 12. A blend according to claim 8, wherein the anionic surfactant is an alkyl sulfonate having an average of about 8 carbon atoms.

10 13. A blend according to claim 8, wherein the anionic surfactant is an alkyl ether sulfate having an average of from about 8 to about 16 carbon atoms in the alkyl portion and from about 1 to about 30 moles of ethylene oxide.

14. A method for preparing an antimicrobial composition comprising combining:

(a) a quaternary ammonium compound of the formula:



15 wherein

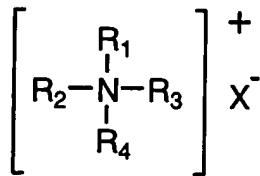
R₁ and R₂ are straight or branched chain lower alkyl groups having from one to seven carbon atoms;

R₃ is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms, or a benzyl group optionally substituted with C₁-C₆ alkyl;

20 R₄ is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms; and

X is an anion forming a water soluble salt;

optionally (d) a cationic surfactant which is a quaternary ammonium compound of the formula:



where

R₁, R₂, and R₃ are independently ethyl or methyl;

R₄ is an alkyl group having an average of from about 8 to about 16 carbon atoms; and

5 X is halogen, sulfate, methosulfate, ethosulfate, tosylate, acetate, phosphate, nitrate, sulfonate, or carboxylate; and

(b) an anionic surfactant which is

(i) an alkyl sulfate having an average of from about 8 to about 16 carbon atoms;

(ii) an alkyl sulfonate having an average of from about 8 to about 18 carbon atoms;

10 (iii) an alkyl ether sulfate having an average of from about 8 to about 16 carbon atoms in the alkyl portion and from about 1 to about 30 moles of ethylene oxide;

(iv) an α -olefin sulfonate having an average of from about 12 to about 18 carbon atoms;

(v) an α -sulfonated C₁-C₆ alkyl ester of a fatty acid having an average of from about 11 to about 16 carbon atoms;

15 (vi) a sulfosuccinate having an average of from about 10 to about 16 carbon atoms;

(vii) a sarcosinate having an average of from about 10 to about 16 carbon atoms; or

(viii) a sulfoacetate having an average of from about 12 to 20 carbon atoms;

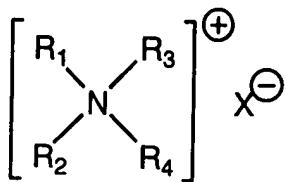
or mixtures thereof; and

20 (c) a bridging surfactant selected from the group consisting of amine oxides, ethoxamides, and betaines;

wherein the total concentration of combined quaternary ammonium compound, anionic, and bridging surfactants is from about 30 to about 80 percent by weight, and wherein the surfactant blend is flowable.

25 15. An antimicrobial composition comprising:

(a) a quaternary ammonium compound of the formula:



wherein

R_1 and R_2 are straight or branched chain lower alkyl groups having from one to seven carbon atoms;

5 R_3 is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms, or a benzyl group optionally substituted with C_1-C_6 alkyl;

R_4 is a straight or branched chain higher alkyl group having from about eight to twenty carbon atoms; and

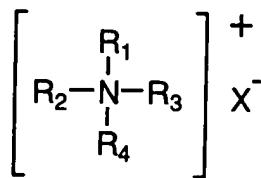
X is an anion forming a water soluble salt:

10 (b) an anionic surfactant which is

- (i) an alkyl sulfate having an average of from about 8 to about 16 carbon atoms;
- (ii) an alkyl sulfonate having an average of from about 8 to about 18 carbon atoms;
- (iii) an alkyl ether sulfate having an average of from about 8 to about 16 carbon atoms in the alkyl portion and from about 1 to about 30 moles of ethylene oxide;
- (iv) an α -olefin sulfonate having an average of from about 12 to about 18 carbon atoms;
- (v) an α -sulfonated C₁-C₆ alkyl ester of a fatty acid having an average of from about 11 to about 16 carbon atoms;
- (vi) a sulfosuccinate having an average of from about 10 to about 16 carbon atoms;
- (vii) a sarcosinate having an average of from about 10 to about 16 carbon atoms; or
- (viii) a sulfoacetate having an average of from about 12 to about 20 carbon atoms;

or mixtures thereof;

optionally (d) a cationic surfactant which is a quaternary ammonium compound of the formula



where

R_1 , R_2 , and R_3 are independently ethyl or methyl;

R_4 is an alkyl group having an average of from about 8 to about 16 carbon atoms; and

5 X is halogen, sulfate, methosulfate, ethosulfate, tosylate, acetate, phosphate, nitrate, sulfonate, or carboxylate;

wherein the total concentration of combined quaternary ammonium compound, anionic, and bridging surfactants is from about 0.1 to about 30 percent by weight, and wherein the surfactant blend is flowable.

10 16. A composition according to claim 15, wherein the anionic surfactant is an alkyl sulfate having an average of from about 10 to about 12 carbon atoms.

17. A composition according to claim 15, wherein the anionic surfactant is an α -sulfonated C_1-C_6 alkyl ester of a fatty acid having an average of from about 11 to about 16 carbon atoms.

15 18. A composition according to claim 15, wherein the anionic surfactant is an alkyl sulfonate having an average of about 8 carbon atoms.

19. A composition according to claim 18, wherein the anionic surfactant is an alkyl ether sulfate having an average of from about 8 to about 16 carbon atoms in the alkyl portion and from about 1 to about 30 moles of ethylene oxide.

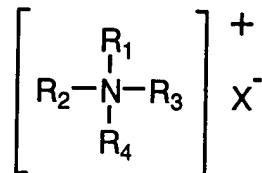
20. An aqueous composition comprising water and the composition of claim 15, where the concentration of the quaternary ammonium compound in the composition is from about 1-3000 ppm.

25

21. An antimicrobial composition according to claim 15, wherein the amount of the blend of

claim 1 is effective to produce a concentration of the anti-microbial compound of from about 1 to about 10 ppm.

22. A composition according to claim 1, further comprising a cationic surfactant of the
5 formula:



where

R₁, R₂, and R₃ are independently ethyl or methyl;

R₄ is an alkyl group having an average of from about 8 to about 16 carbon atoms; and

10 X is halogen, sulfate, methosulfate, ethosulfate, tosylate, acetate, phosphate, nitrate, sulfonate, or carboxylate.